Amendments

In the claims:

1. (currently amended) An electrosurgical catheter, comprising:

a shaft having a shaft proximal end portion and a shaft distal end portion;

an electrode support arranged on the shaft distal end portion, the electrode support having a support distal end;

at least one active electrode disposed on the support distal end, wherein the at least one active electrode comprises a metal wire comprising from about 75% to about 99.95% platinum and from about 0.05% to about 25% iridium; and

at least one return electrode disposed on the shaft distal end portion and wherein the at least one return electrode is arranged on an insulating liner, and the insulating liner is disposed on the shaft.

2. (cancelled).

3. (currently amended) The electrosurgical catheter of claim 1 ~~claim 2~~, wherein the insulating liner comprises a polyimide.

4. (original) The electrosurgical catheter of claim 1, wherein the at least one active electrode comprises a loop portion consisting essentially of an alloy of platinum and iridium.

5. (original) The electrosurgical catheter of claim 1, wherein the at least one active electrode comprises a plurality of active electrodes, each of the plurality of active electrodes is in communication with a corresponding one of a plurality of active electrode leads, each of the plurality of active electrode leads comprises a wire having a diameter in

the range of from about 0.002" to about 0.008", and the wire comprises an alloy of platinum and iridium.

6. (original) The electrosurgical catheter of claim 1, wherein the at least one active electrode is in communication with an active electrode lead, the active electrode lead comprising a distal active electrode lead portion and a proximal active electrode lead portion coupled to the distal active electrode lead portion, wherein the distal active electrode lead comprises from about 75% to about 99.95% platinum and from about 0.05% to about 25% iridium.

7. (original) The electrosurgical catheter of claim 6, wherein the proximal active electrode lead portion comprises at least 50% molybdenum.

8. (Withdrawn) The electrosurgical catheter of claim 6, wherein the distal active electrode lead portion includes an insulating layer comprising a fluoropolymer or a polyimide, and the proximal active electrode lead portion includes an insulating layer comprising a polyimide.

9. (Withdrawn) The electrosurgical catheter of claim 6, wherein the distal active electrode lead portion comprises from about 2% to about 30% of the total length of the active electrode lead, and the proximal active electrode lead portion comprises from about 70% to about 98% of the total length of the active electrode lead.

10. (Withdrawn) An electrosurgical catheter, comprising:

a shaft having a shaft proximal end portion and a shaft distal end portion;

an electrode support arranged on the shaft distal end portion, the electrode support having a support distal end portion;

a plurality of active electrodes disposed on the support distal end portion, the electrode support including at least one electrode socket therein for accommodating at

least one of the plurality of active electrodes, wherein the at least one of the plurality of active electrodes is recessed within the support distal end portion; and

at least one return electrode disposed on the shaft distal end portion proximal to the electrode support.

11. (Withdrawn) The electrosurgical catheter of claim 10, wherein the electrode support includes at least one fluid delivery channel on an external surface of the electrode support.

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12. (Withdrawn) An electrosurgical catheter, comprising:

a shaft having a shaft proximal end portion and a shaft distal end portion;

an electrode support arranged on the shaft distal end portion, the electrode support having a support distal end and a belly portion, the electrode support tapering from narrow to broad from the support distal end to the belly portion;

a return electrode disposed on the shaft distal end proximal to the electrode support; and

a plurality of active electrodes disposed on the support distal end portion, each of the plurality of active electrodes including a loop portion, wherein the loop portion comprises a curved wire comprising platinum.

13. (Withdrawn) The electrosurgical catheter of claim 12, wherein the electrode support comprises a silicone rubber, and the plurality of active electrodes are sealably disposed on the support distal end.

14. (Withdrawn) The electrosurgical catheter of claim 12, wherein each of the plurality of active electrodes comprises a wire comprising about 85-95% platinum and about 5-15% iridium.

15. (Withdrawn) The electrosurgical catheter of claim 12, wherein the electrode support has a substantially conical external surface, and the loop portion is arranged substantially parallel to the external surface of the electrode support.

16. (Withdrawn) The electrosurgical catheter of claim 15, wherein the loop portion is separated from the external surface of the electrode support by a gap in the range of from about 0.002" to about 0.010".

17. (Withdrawn) The electrosurgical catheter of claim 12, wherein the loop portion is recessed within an external surface of the electrode support.

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18. (Withdrawn) The electrosurgical catheter of claim 12, wherein the loop portion is recessed within an electrode socket located on the support distal end portion.

19. (Withdrawn) The electrosurgical catheter of claim 12, wherein the loop portion is recessed within an external surface of the support distal end portion by a distance in the range of from about 0.002" to about 0.010".

20. (Withdrawn) The electrosurgical catheter of claim 12, wherein the electrode support comprises a silicone rubber, and each of the plurality of active electrodes are sealed within the electrode support.

21. (Withdrawn) The electrosurgical catheter of claim 12, wherein the plurality of active electrodes are four in number.

22. (Withdrawn) The electrosurgical catheter of claim 12, wherein the plurality of active electrodes are two in number.

23. (Withdrawn) An apparatus, comprising:

an electrosurgical catheter including a shaft having a shaft distal end portion, an electrode support disposed on the shaft distal end portion, a return electrode disposed at the shaft distal end at a location proximal to the electrode support, and at least one active electrode arranged on the electrode support; and

a high frequency power supply adapted for supplying a high frequency voltage to each of the at least one active electrodes, wherein the high frequency power supply comprises at least one of a fluid interlock, a power limiting device, a spark limiting device, and a current sensor.

24. (Withdrawn) The apparatus of claim 23, wherein the high frequency power supply includes a power limiting device, a spark limiting device, and a current sensor.

25. (Withdrawn) The apparatus of claim 23, further comprising a guidewire for guiding the shaft distal end portion to a target site, wherein the electrosurgical catheter includes a guidewire lumen for accommodating the guidewire.

26. (Withdrawn) The apparatus of claim 23, further comprising a catheter cable for independently coupling each of the at least one active electrode and the return electrode to the power supply, the catheter cable integral with the catheter.

27. (original) An electrosurgical catheter, comprising:

a shaft having a shaft proximal end portion and a shaft distal end portion;

an electrode support arranged on the shaft distal end portion, the electrode support having a support distal end, a support proximal end, and a belly portion located between the support distal end and the support proximal end, wherein the width of the belly portion is greater than the width of the shaft;

at least one active electrode disposed on the electrode support; and

at least one return electrode disposed on the shaft distal end portion at a location proximal to the electrode support.

28. (original) The electrosurgical catheter of claim 27, wherein the shaft comprises a material selected from the group consisting essentially of a polyether-based polyamide, polyurethane, polyethylene and nylon.

29. (currently amended) The electrosurgical catheter of claim 27, wherein the electrode support comprises a material selected from the group consisting of: a ceramic, a glass, polytetrafluoroethylene ~~Teflon~~, urethane, a polyurethane, a polyimide, and ~~or~~ a silicone rubber.

30. (original) The electrosurgical catheter of claim 27, wherein the electrode support tapers from narrow to broad from the support distal end to the belly portion.

31. (original) The electrosurgical catheter of claim 30, wherein the electrode support tapers from broad to narrow from the belly portion to the support proximal end.

32. (original) The electrosurgical catheter of claim 30, wherein the electrode support comprises a silicone rubber.

33. (original) The electrosurgical catheter of claim 27, further comprising at least one lumen extending along the shaft.

34. (Withdrawn) The electrosurgical catheter of claim 33, wherein the at least one lumen comprises a fluid delivery lumen.

35. (Withdrawn) The electrosurgical catheter of claim 34, wherein the at least one lumen is external to the shaft.

36. (original) The electrosurgical catheter of claim 33, wherein the at least one lumen comprises a guidewire lumen for accommodating a guidewire.

37. (Withdrawn) The electrosurgical catheter of claim 27, further comprising:

at least one active electrode lead, each of the at least one active electrode leads in communication with a corresponding one of the at least one active electrodes; and

a catheter cable in communication with each of the at least one active electrode leads, the catheter cable integral with the electrosurgical catheter.

38. (Withdrawn) The electrosurgical catheter of claim 34, wherein the fluid delivery lumen comprises an outer sheath external to the shaft, the outer sheath being at a fixed location relative to the shaft, and the outer sheath defining an annular fluid delivery lumen external to the shaft, the outer sheath having a plurality of fluid delivery ports therein.

39. (Withdrawn) The electrosurgical catheter of claim 38, wherein the plurality of fluid delivery ports are located adjacent to the shaft distal end portion at a position proximal to the return electrode.

40. (Withdrawn) The electrosurgical catheter of claim 34, wherein the fluid delivery lumen comprises a moveable outer sheath external to the shaft, the outer sheath defining an annular fluid delivery lumen external to the shaft, the outer sheath having an annular fluid delivery port at the outer sheath distal terminus.

41. (original) An electrosurgical catheter, comprising:

a shaft having a shaft proximal end portion and a shaft distal end portion;

an electrode support arranged on the shaft distal end portion, the electrode support having a support distal end, a support proximal end, and a belly portion located between the support distal end and the support proximal end;

at least one active electrode disposed on the electrode support, wherein the at least one active electrode is located distal to the belly portion; and

a return electrode disposed on the shaft distal end portion proximal to the electrode support, the return electrode in communication with a return electrode lead.

42. (original) The electrosurgical catheter of claim 41, wherein the at least one active electrode comprises a plurality of active electrodes, and each of the plurality of active electrodes comprises a loop electrode.

43. (original) The electrosurgical catheter of claim 42, wherein each of the loop electrodes comprises a first free end, a loop portion, and a second connected end.

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44. (original) The electrosurgical catheter of claim 43, wherein each of the second connected ends is in communication with a distal active electrode lead.

45. (original) The electrosurgical catheter of claim 44, further comprising at least one proximal active electrode lead, each of the at least one proximal active electrode leads in communication with a corresponding one of the distal active electrode leads.

46. (original) The electrosurgical catheter of claim 44, wherein each of the loop electrodes and each of the distal active electrode leads consists essentially of platinum.

47. (original) The electrosurgical catheter of claim 44, wherein each of the loop electrodes and each of the distal active electrode leads consist essentially of a platinum-iridium alloy.

48. (original) The electrosurgical catheter of claim 44, wherein each of the loop electrodes and each of the distal active electrode leads comprise from about 75% to about 99.95% platinum and from about 0.05% to about 25% iridium.

49. (Withdrawn) The electrosurgical catheter of claim 41, further comprising a catheter cable adapted for independently coupling each of the at least one active electrodes to a high frequency power supply, wherein the catheter cable is integral with the electrosurgical catheter.

50. (Withdrawn) The electrosurgical catheter of claim 49, further comprising at least a first handle, wherein the catheter cable is connected to the first handle.

51. (original) The electrosurgical catheter of claim 41, wherein each of the at least one active electrodes comprises a metal wire, and the metal wire comprises a material selected from the group consisting of platinum, iridium, molybdenum, titanium, aluminum, nickel, tungsten, and tantalum.

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52. (original) The electrosurgical catheter of claim 41, wherein each of the at least one active electrodes comprises a metal wire having a diameter in the range of from about 0.002" to about 0.020".

53. (original) The electrosurgical catheter of claim 41, wherein each of the at least one active electrodes includes a loop portion comprising a metal wire having a cross-sectional shape selected from the group consisting of substantially round, substantially square, and substantially triangular.

54. (original) The electrosurgical catheter of claim 41, wherein each of the at least one active electrodes includes a loop portion comprising a metal wire having a cross-sectional shape including at least one cusp or serration.

55. (original) The electrosurgical catheter of claim 41, wherein the width of the belly portion is greater than or equal to the width of the shaft.

56. (original) The electrosurgical catheter of claim 41, wherein the support distal end portion is substantially conical in shape.

57. (original) The electrosurgical catheter of claim 41, wherein each of the at least one active electrodes includes a loop portion, and the loop portion is curved.

58. (Withdrawn) The electrosurgical catheter of claim 41, wherein each of the at least one active electrodes includes a loop portion, and the loop portion is separated from the electrode support by a gap.

59. (Withdrawn) The electrosurgical catheter of claim 58, wherein the loop portion is separated from the electrode support by a distance of up to about 0.5 mm.

60. (Withdrawn) The electrosurgical catheter of claim 41, wherein each of the at least one active electrodes includes a loop portion, and the loop portion is recessed within the electrode support by a distance in the range of from about 0.05 to about 0.25 mm.

61. (original) The electrosurgical catheter of claim 41, wherein the return electrode comprises an annular band of a metal.

62. (original) The electrosurgical catheter of claim 61, wherein the return electrode consists essentially of platinum.

63. (original) The electrosurgical catheter of claim 61, wherein the return electrode consists essentially of a platinum-iridium alloy.

64. (original) The electrosurgical catheter of claim 41, wherein the return electrode comprises from about 75% to about 99.95% platinum and from about 0.05% to about 25% iridium.

65. (original) The electrosurgical catheter of claim 41, wherein the shaft is at least substantially rigid and has a length in the range of from about 120 cm to about 140 cm.

66. (original) The electrosurgical catheter of claim 41, wherein the shaft is flexible and has a length in the range of from about 120 cm to about 150 cm.

67. (original) The electrosurgical catheter of claim 41, wherein an external surface of the shaft distal end has an external hydrophilic coating.

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68. (original) The electrosurgical catheter of claim 41, wherein the return electrode comprises notches to increase a surface area of the return electrode.

69. (original) The electrosurgical catheter of claim 41, wherein the return electrode comprises a pitch coil to minimize current induction.

70. (Withdrawn) A method of recanalizing a body passage, comprising:

a) advancing a shaft distal end of an electrosurgical catheter towards an occlusion in the body passage, the shaft distal end terminating in an electrode support, the electrode support including a belly portion and a support distal end, the belly portion wider than the shaft, the support distal end having a plurality of active loop electrodes arranged therein, each of the plurality of active loop electrodes independently coupled to a power supply, and each of the plurality of active loop electrodes comprises a loop portion, and the loop portion comprises a wire comprising platinum;

b) supplying a high frequency voltage from the power supply to at least one of the plurality of active loop electrodes; and

c) ablating at least a portion of the occlusion

71. (Withdrawn) The method of claim 70, wherein the plurality of active loop electrodes comprise between two and four active loop electrodes.

72. (Withdrawn) The method of claim 70, wherein the electrode support comprises a silicone rubber, and the wire comprises from about 75% to about 99.95% platinum and from about 0.05% to about 25% iridium.

73. (Withdrawn) The method of claim 70, wherein the loop portion is arranged substantially parallel to an external surface of the support distal end, and the loop portion defines a gap ranging from 0.002" to about 0.010".

74. (Withdrawn) The method of claim 70, wherein said advancing step comprises advancing the shaft distal end through the body passage.

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75. (Withdrawn) The method of claim 70, wherein the shaft distal end is expansible, and the method further comprises:

changing the outer diameter of the shaft distal end.

76. (Withdrawn) The method of claim 75, wherein the body passage is partly occluded by the occlusion, and said changing step comprises expanding or contracting the shaft distal end according to a diameter of the body passage in the region of the occlusion.

77. (Withdrawn) The method of claim 70, wherein the shaft distal end is expansible, and the method further comprises:

after said supplying step, expanding the shaft distal end; and wherein said expanding and supplying steps are sequentially repeated until the occlusion is ablated.

78. (Withdrawn) The method of claim 70, further comprising:

fluidly isolating the body passage in the region of the occlusion; and

delivering an electrically conductive fluid to the body passage in the region of the occlusion, wherein the electrically conductive fluid provides a current flow path between each of the plurality of active loop electrodes and at least one return electrode, wherein the at least one return electrode is disposed on the shaft distal end at a location proximal to the electrode support.

79. (Withdrawn) The method of claim 78, wherein said fluidly isolating the body passage comprises inflating a distal inflatable balloon at a position within the body passage distal to the occlusion and inflating a proximal inflatable balloon at a position within the body passage proximal to the occlusion.

80. (Withdrawn) A method of recanalizing a body passage, comprising:

a) advancing a shaft distal end of an electrosurgical catheter towards an occlusion in the body passage, the shaft distal end having an electrode support arranged thereon, and a plurality of active loop electrodes disposed on the electrode support, each of the plurality of active electrodes independently coupled to a power supply;

b) supplying a high frequency voltage from the power supply to at least one of the plurality of active electrodes; and

c) ablating at least a portion of the occlusion, wherein the ablating step involves exposure of the body passage to a temperature not exceeding 45° C.

81. (Withdrawn) The method of claim 80, wherein said ablating step involves exposure of the occlusion to a temperature in the range of from about 40° C to about 45° C.

82. (Withdrawn) A method of maintaining patency in a body passage, comprising:

advancing a shaft distal end portion of an electrosurgical catheter towards an occlusion in the body passage, the shaft distal end portion having an electrode support arranged thereon, a return electrode disposed proximal to the electrode support on the

shaft distal end portion, and a plurality of active electrodes disposed on the electrode support, each of the plurality of active electrodes independently coupled to a power supply, the power supply comprising at least one power regulatory component selected from the group consisting of a fluid interlock, a power limiting device, and a spark limiting device;

supplying a high frequency voltage from the power supply to at least one of the plurality of active electrodes; and

ablating at least a portion of the occlusion.

83. (Withdrawn) The method of claim 82, wherein the power supply comprises a power limiting device, a spark limiting device, and a current sensor.

84. (Withdrawn) The method of claim 82, wherein the occlusion is within an electrically conductive prosthesis, and supplying power from the power supply to a first set of the plurality of active electrodes continues without interruption if a second set of the plurality of active electrodes inadvertently contacts the prosthesis, and wherein supplying power from the power supply to the second set of the plurality of active electrodes is interrupted when the second set of the plurality of active electrodes inadvertently contacts the prosthesis.

85. (Withdrawn) The method of claim 82, wherein the body passage is a blood vessel containing a metal stent, and the occlusion comprises atheromatous material.

86. (Withdrawn) The method of claim 82, wherein each of the plurality of active electrodes is capable of generating high electric field intensities and of ablating the occlusion by a process involving molecular dissociation of components of the occlusion to form low molecular weight ablation by-products.

87. (Withdrawn) A method of recanalizing a body passage, comprising:

a) providing a catheter having a plurality of active electrodes independently coupled to a power supply;

b) advancing the catheter within the body passage such that the plurality of active electrodes are in at least close proximity to an occlusion within the body passage;

c) supplying a high frequency voltage from the power supply to each of the plurality of active electrodes such that high electric field intensities are generated in the vicinity of each of the plurality of active electrodes, wherein the high electric field intensities are sufficient to cause the volumetric removal of the occlusion; and

d) ablating at least a portion of the occlusion with at least a first of the plurality of active electrodes, wherein said step d) continues unabated in the event that at least a second of the plurality of active electrodes makes inadvertent contact with a low impedance object.

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88. (Withdrawn) The method of claim 87, wherein the power supply includes at least one power regulatory component selected from the group consisting of a power limiting device and a spark limiting device.

89. (Withdrawn) The method of claim 88, wherein the power supply further includes a current sensor in communication with the at least one power regulatory component.

90. (Withdrawn) The method of claim 87, further comprising: delivering an electrically conductive fluid within the body passage in the vicinity of the plurality of active electrodes, wherein the power supply includes a fluid interlock, and the fluid interlock interrupts supply of electrical power to the plurality of active electrodes in the event that a quantity of the electrically conductive fluid in the vicinity of the plurality of active electrodes falls below a minimum threshold level.

91. (Withdrawn) The method of claim 87, wherein the plurality of active electrodes are disposed on a support distal end of an electrode support, the electrode

support located on a shaft distal end of the catheter, the electrode support comprising a silicone rubber, the support distal end tapering from narrow to broad in a proximal direction, and the plurality of active electrodes comprising from about 75% to about 99.95% platinum and from about 0.05% to about 25% iridium.

92. (Withdrawn) The method of claim 87, wherein the body passage comprises a blood vessel, and a temperature generated within the body passage does not exceed about 45° C.

93. (Withdrawn) The method of claim 87, wherein said step c) comprises supplying a high frequency voltage having frequency in the range of from about 450 kHz to about 500 kHz.

94. (Withdrawn) The method of claim 87, wherein the high frequency voltage supplied in said step c) is in the range of from about 10 volts to about 500 volts root mean square (RMS).

95. (Withdrawn) The method of claim 87, wherein the high frequency voltage supplied in said step c) is in the range of from about 100 volts to about 300 volts root mean square (RMS).

96. (Withdrawn) A method of making an electrosurgical catheter, comprising:

a) providing a return electrode assembly, the return electrode assembly including a return electrode coupled to a return electrode lead;

b) providing an active electrode assembly, the active electrode assembly including at least one active electrode terminal and at least one active electrode lead;

c) assembling the return electrode assembly to a catheter shaft having a shaft distal end and a shaft proximal end;

d) assembling the active electrode assembly to the catheter shaft;

e) arranging the at least one active electrode terminal in an electrode support to form at least one active loop electrode, wherein the at least one active loop electrode comprises a wire comprising platinum, the at least one active loop electrode including a loop portion, and the electrode support comprises an insulating material;

f) affixing the electrode support to the shaft distal end; and

g) affixing the return electrode to the shaft distal end at a location proximal to the electrode support.

97. (Withdrawn) The method of claim 96, wherein said step a) comprises:

providing a length of a first wire having a distal end and a proximal end, the first wire comprising platinum;

coupling the proximal end of the first wire to a length of a second wire to form the return electrode lead, wherein the second wire comprises molybdenum; and

spot welding the return electrode lead to the return electrode.

98. (Withdrawn) The method of claim 96, wherein said step b) comprises:

providing a length of a first wire having a distal end and a proximal end, the first wire having a layer of a first electrical insulation thereon, and the first wire comprising platinum;

coupling the proximal end of the first wire to a length of a second wire, wherein the second wire comprises molybdenum; and

removing the layer of the first electrical insulation from a portion of the distal end of the first wire to form the at least one active electrode terminal.

99. (Withdrawn) The method of claim 96, wherein said step e) comprises:

forcing the at least one active electrode terminal through the electrode support; and thereafter

bending the at least one active electrode terminal to form the loop portion.

100. (Withdrawn) The method of claim 96, wherein said step e) comprises:

bending the at least one active electrode terminal to form the loop portion; and thereafter

molding the electrode support around the at least one active loop electrode, wherein the loop portion is exposed on an external surface of the electrode support.

101. (Withdrawn) The method of claim 96, further comprising:

arranging a fluid delivery sheath external to the shaft.

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102. (Withdrawn) The method of claim 96, further comprising:

applying an external coating to the shaft distal end, wherein the external coating comprises a bio-compatible material which promotes lubricity of the shaft distal end.